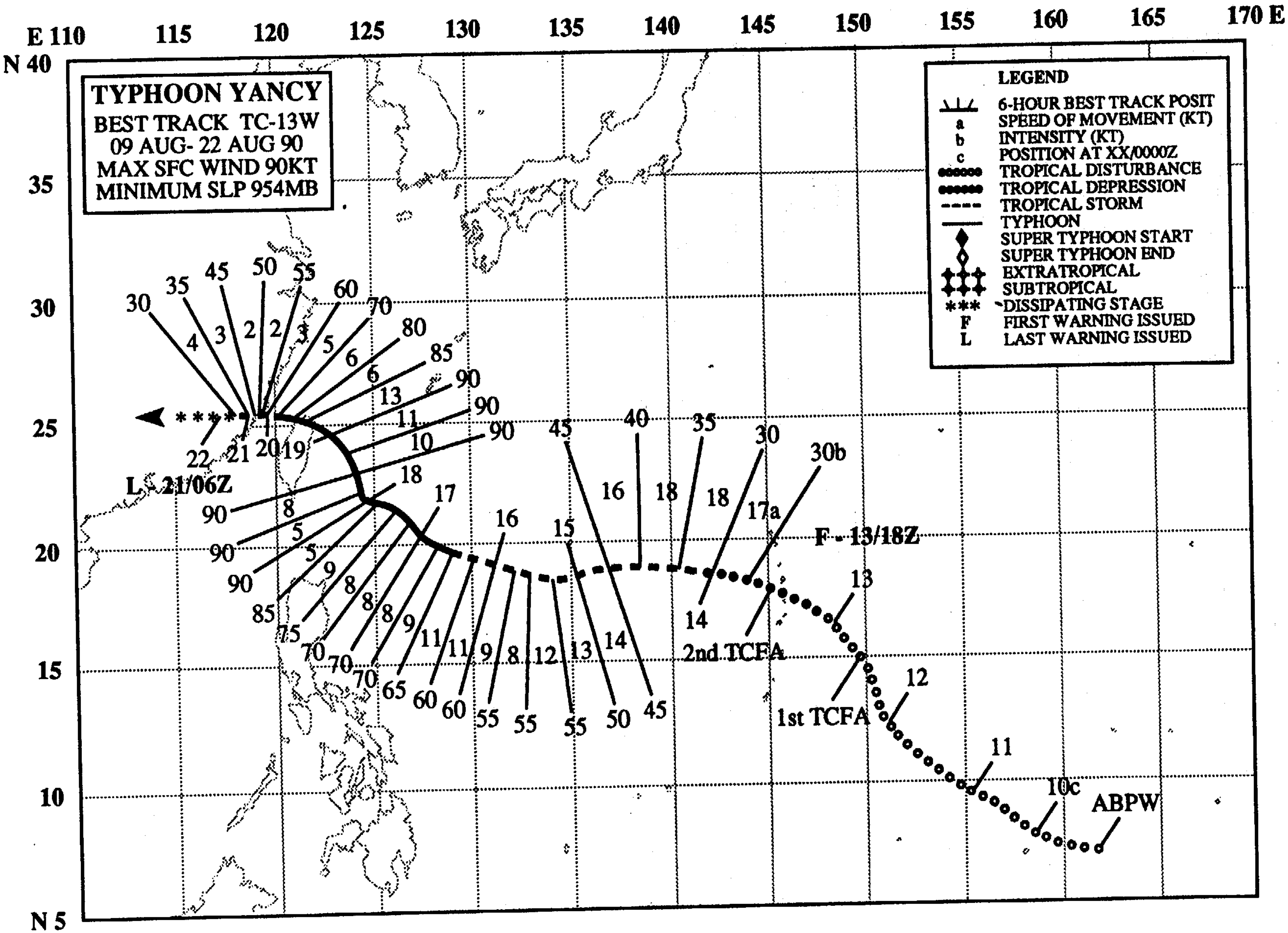

TYPHOON YANCY
BEST TRACK TC-13W
09 AUG- 22 AUG 90
MAX SFC WIND 90KT
MINIMUM SLP 954MB
LEGEND
6-HOUR BEST TRACK POSIT
a SPEED OF MOVEMENT (KT)
b INTENSITY (KT)
c POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
SUBTROPICAL
DISSIPATING STAGE
F FIRST WARNING ISSUED
L LAST WARNING ISSUED
E 110
115
120
125
130
135
140
145
150
155
160
165
170 E
N 40
35
30
25
20
15
10
N 5
L - 21/06Z
F - 13/18Z
1st TCFA
2nd TCFA
ABPW

TYPHOON YANCY (13W)

I. HIGHLIGHTS

Yancy, JTWC's best forecast tropical cyclone of the year, was one of a series of August storms that generated in the monsoon trough. Although the track was generally toward the northwest, it contained several interesting features, including interaction with a strengthening subtropical ridge, the effects of a passing mid-latitude shortwave trough and land interaction with the mountainous terrain of Taiwan.

II. CHRONOLOGY OF EVENTS

090600Z - First mentioned on the Significant Tropical Weather Advisory as an area of persistent convection with an estimated minimum sea-level pressure of 1008 mb.

112100Z - First Tropical Cyclone Formation Alert based on an increase in central convection, more pronounced upper-level outflow and surface pressure decreases at several nearby land stations.

121400Z - Second Tropical Cyclone Formation Alert based on a northward shift of a consolidating low-level center and continued drops in surface pressure at several nearby land stations.

131400Z - Third Tropical Cyclone Formation Alert based on a continued increase in organization, deep central convection and an approaching surge in southwest monsoon flow.

131800Z - First warning due to increased consolidation of central convection and improvements in the upper-level outflow.

141200Z - Upgrade to tropical storm prompted by increased convective curvature, consolidation of the cyclonic center and the first intensity estimate of CI 2.5.

161200Z - Upgrade to typhoon prompted by a decrease in vertical wind shear, improved organization in the deep central convection, improved upper-level outflow and intensity estimates of CI 4.0.

180000Z - Peak intensity - 90 kt (46 m/sec) - based on intensity estimate of CI 5.0.

200000Z - Downgraded to tropical storm based on radar reports, synoptic reports and satellite imagery which indicated significant weakening due to land interaction as the system crossed Taiwan.

210600Z - Downgraded to tropical depression due to the effects of land interaction and increased vertical wind shear.

210600Z - Final warning - dissipated - based on a combination of land interaction and increased vertical wind shear as the system moved into mainland China.

III. TRACK AND MOTION

The LLCC which developed into Yancy generated on the eastern side of a broad monsoon depression. A series of vortices persisted at low latitudes for four days before consolidating into Yancy. In its formative stages, Yancy moved erratically as mesoscale convective elements developed, decayed, and were replaced by new elements. The resulting large monsoon depression moved generally westward at 8 to 10 kt (15 to 20 km/hr) until 13 August. A 48-hour period of rapid westward movement followed as Yancy moved into an area dominated by a strengthening subtropical ridge to the north (Figure 3-13-1). This westward track continued until a mid-latitude shortwave trough moving off the coast of China weakened the subtropical ridge over the East China Sea (Figure 3-13-2), resulting in an 18-hour period of north-northwestward movement. The system resumed its westward track across Taiwan as the subtropical ridge reestablished itself. Yancy executed a mesoscale trochoidal oscillation (wobble) about a smoothed track as it moved past Taiwan as depicted by radar position reports from Hualein (WMO 46699), Taiwan in Figure 3-13-3.

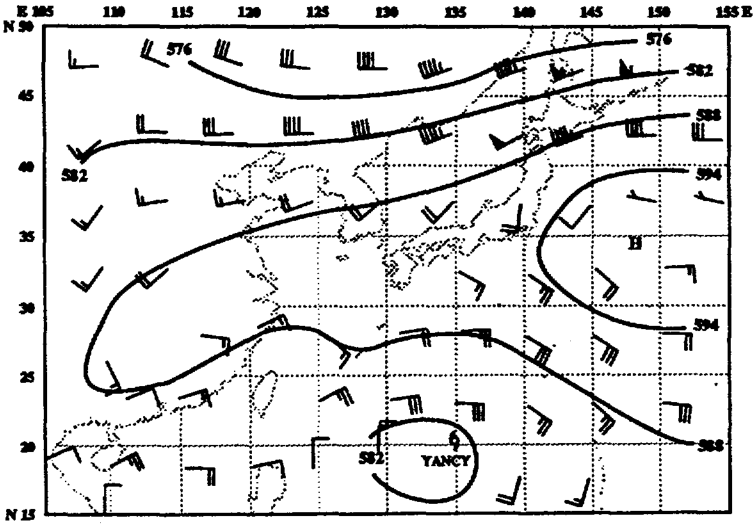
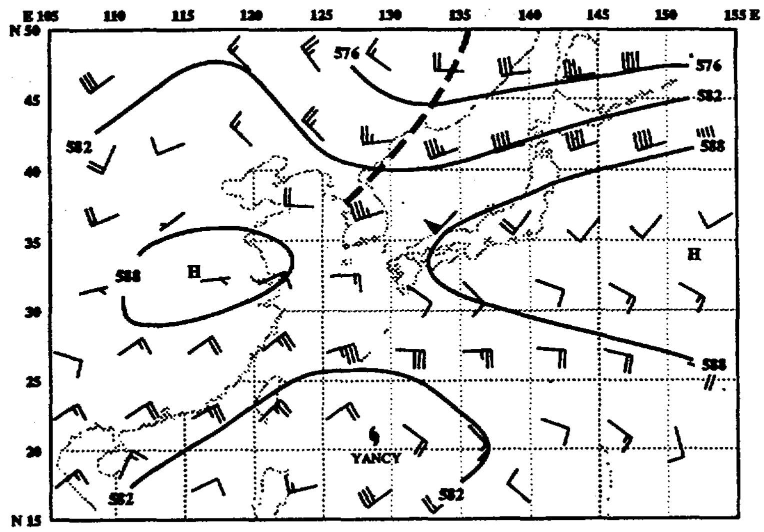


Figure 3-13-1. 500-mb NOGAPS analysis from 150000Z August, showing the strengthening of the mid-level ridge north of Yancy which resulted in the westward track.

Figure 3-13-2. 500-mb NOGAPS analysis from 170000z August, showing a passing shortwave trough weakening the mid-level subtropical ridge, which resulted in a jog in the track to the north-northwestward.



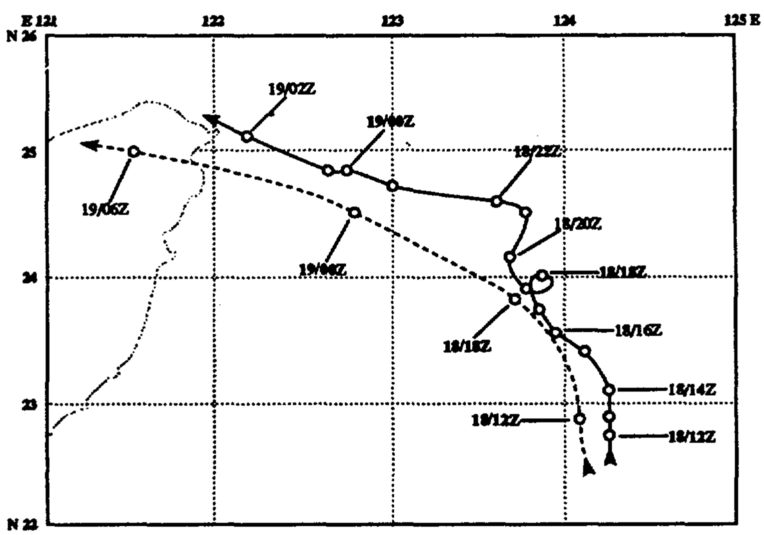


Figure 3-13-3. Plots of hourly radar positions from Hualein (WMO 46699), Taiwan compared to the smoothed best track (dashed line) show Yancy's wobble.

IV. INTENSITY

At 150000Z August, Yancy had a distinct low-level circulation center on the poleward side of the monsoon cloud mass (Figure 3-13-4). The poleward dislocation was attributed to strong upper-level flow from the north and east that apparently inhibited rapid development. A strongly divergent flow became established over the system on August 17, with outflow branches into the equatorial easterlies and into the major TUTT cell to the east-northeast (Figure 3-13-5). Fairly slow deepening to maximum intensity followed and Yancy developed an eye on 18 August (Figure 3-13-6). Weakening and decay were directly attributable to the close approach to the Taiwan mountains, followed by landfall on mainland China.

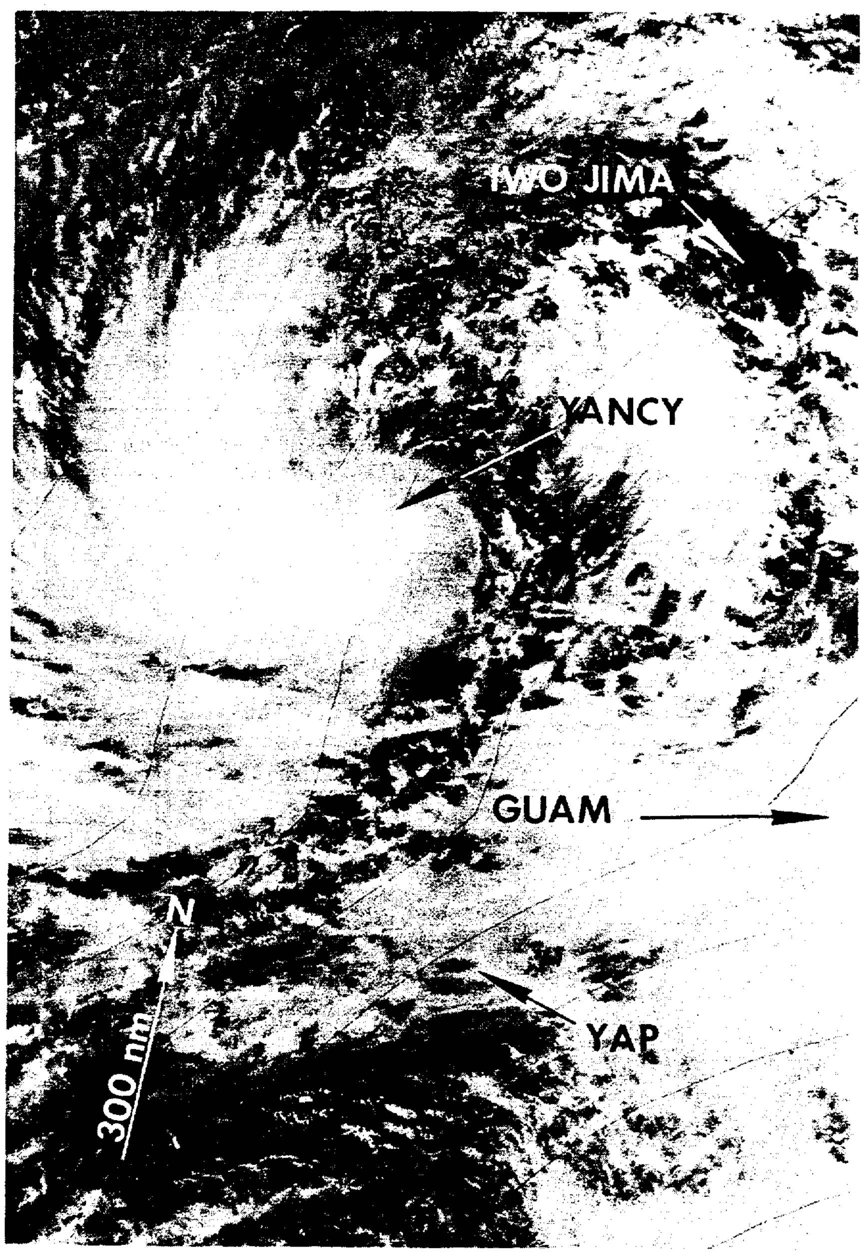


Figure 3-13-4. Tropical Storm Yancy (13W) as it separates from the convection associated with the monsoon trough. Note the area of strong low-level convergence southeast of the system. This area was associated with a strong surge in the monsoon flow from which Yancy separated (150504Z August NOAA visual imagery).

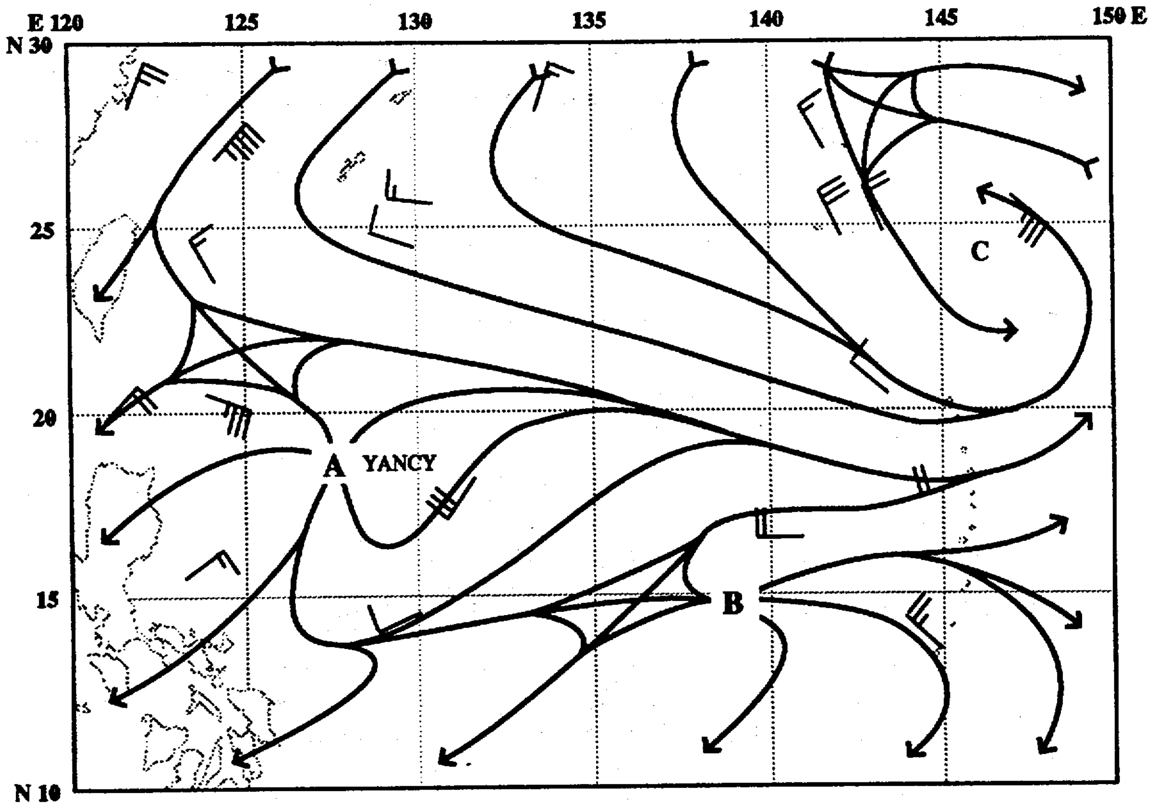


Figure 3-13-5. The 170000z August 200-mb analysis, with Yancy at point A, showing the upper-level outflow channel to the southwest and eastward into the large TUTT cell at point C. The outdraft at point B is over deep convection associated with the formation of Zola (14W).

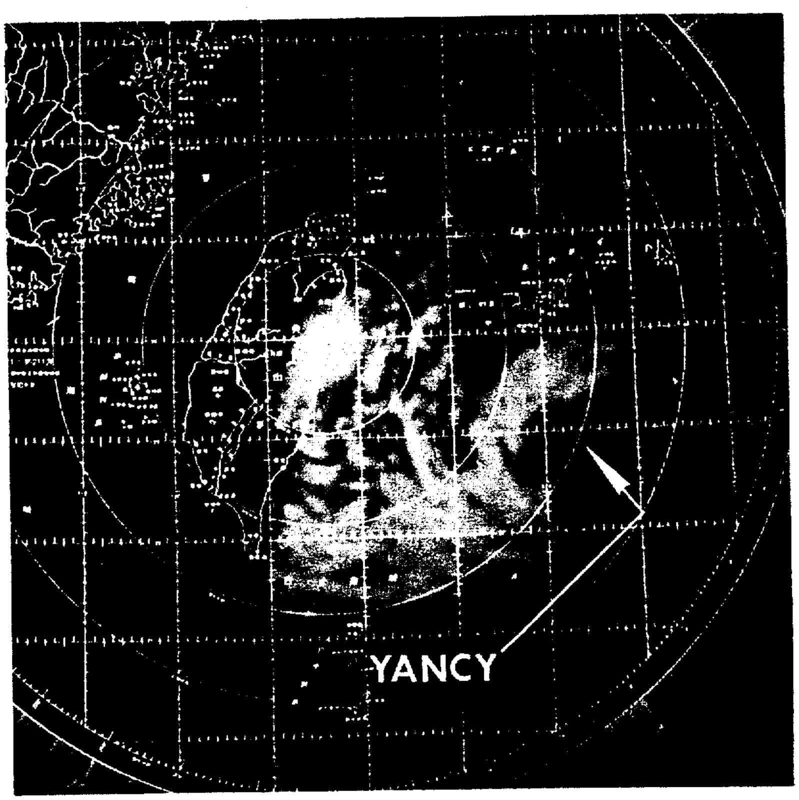


Figure 3-13-6. Yancy's eye appears at the edge of the radar scope at Hualein (WMO 46699), Taiwan (181200Z August photo courtesy of the Central Weather Bureau, Taipei, Taiwan).

V. FORECASTING PERFORMANCE

Although Yancy followed what might appear to be a simple northwestward track, it proved to be a difficult forecast scenario. At two key points during the forecast cycle, the forecast aids and NOGAPS prognostic charts were not in agreement as to the final storm track. As the tropical storm passed through the northern Mariana Islands, the statistical forecast aids indicated that the storm would recurve, while the dynamic forecast aids and the NOGAPS model indicated the system would move westward in response to a building mid-level ridge to the north. The second difficult forecast decision came as the storm approached Taiwan. The statistical forecast aids, the ECMWF model, the NMC model and the Japanese model all called for the system to recurve in response to a passing mid-latitude shortwave trough. The dynamic forecast aids and the NOGAPS model forecast the system to track westward toward a col in the mid-level subtropical ridge over eastern China. As Figure 3-13-7 indicates, JTWC chose the correct forecast at each of these key forecast points. Yancy proved to be JTWC's best forecast storm of the year, with errors of 97nm (180km) at 24 hours, 98nm (182km) at 48 hours and 108nm (200km) at 72 hours.

VI. IMPACT

Yancy passed through the northern Philippine Sea, triggering a deep monsoon surge that resulted in heavy rains and flooding on northern Luzon, leaving at least six people dead and more than 60,000 people fleeing to evacuation centers. Yancy's next impact was felt on Taiwan as it brought heavy winds and torrential rains to the northern half of the island before moving into mainland China. There, the death toll climbed to 216 people, with an additional 59 reported missing and an estimated economic loss of approximately 170 million dollars.

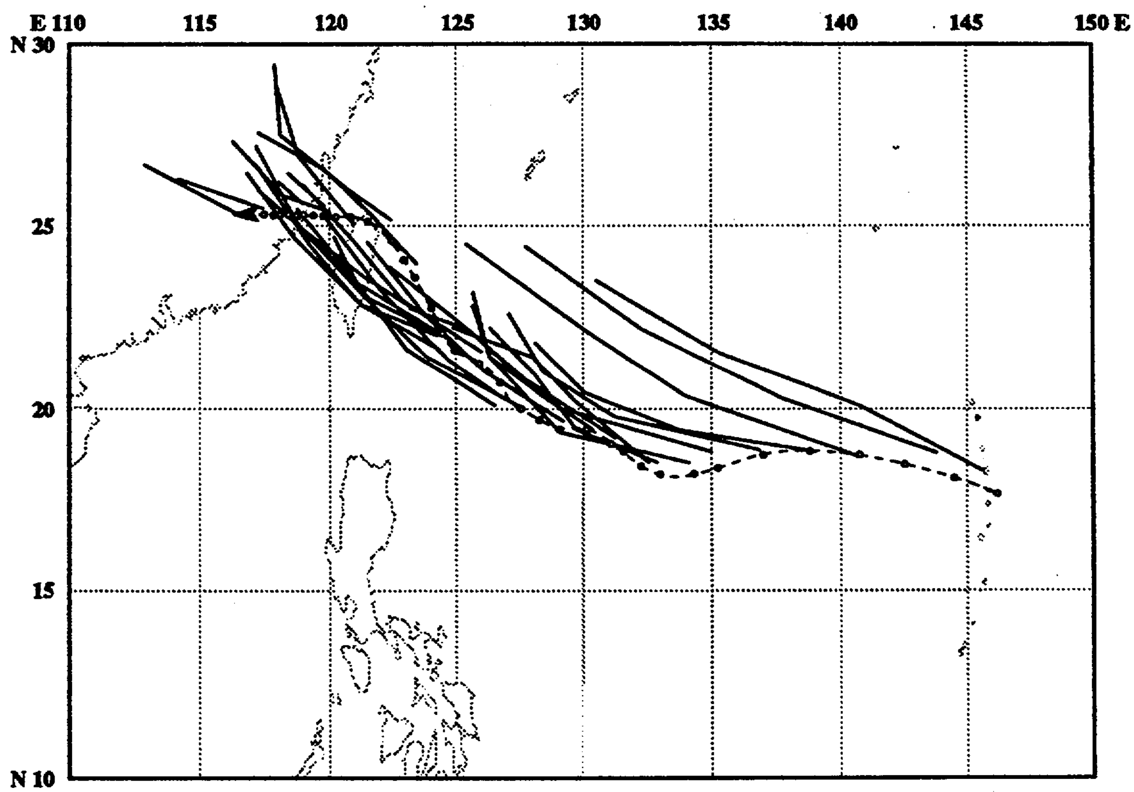


Figure 3-13-7. Summary of JTWC forecasts (solid lines) for Yancy is superimposed on the final best track (dashed line).